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RESEARCH ARTICLE

New data on spiders (Arachnida, Aranei) from the caves of Southwestern Siberia (Russia)

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Abstract

The paper reports six species of spiders from five families found in three caves located in the Altai Krai, Novosibirsk Oblast and Kemerovo Oblast of Russia. One troglophilic species, *Improphantes improbulus* (Simon, 1929) is recorded from Siberia and the Altai Mountains for the first time and another troglophile species, *Metellina merianae* (Scopoli, 1763) is recorded from the Novosibirsk Oblast for the first time. *Improphantes improbulus*, a species new to Siberia, is illustrated. The distribution and habitat preferences of all six species is discussed.

Keywords

Altai Mountains, Araneae, cave fauna, new records, Salair Ridge, troglophile species

Introduction

Spiders are among the most common cave arthropods. Troglophile and troglobiont species are known among many spider families. In the former USSR countries troglophile spiders are represented by the following families: Agelenidae, Cybaeidae, Hahniidae, Linyphiidae, Nesticidae, Pholcidae, Tetragnathidae and Theridiidae (Turbanov et al. 2016). Within this territory, the highest species diversity was ob-

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served in the southern regions of the European part (the Carpathian Mountains and the Crimea) and in the Caucasus. A small number of spider species were reported from the caves in the Ural Mountains and only one species, from the Amur Oblast of Russia (Marusik 1987). To date, no spider species were recorded in special arachnological literature from the caves of Siberia, the largest part of Russia. While there are more than 1,400 caves in Siberia (Jubertie et al. 2016), only several species of Linyphiidae (*Tenuiphantes alacris* (Blackwall, 1853), *Scotargus pilosus* Simon, 1913 and *Stemonyphantes* sp.) were reported for the caves of Kamyshlinskoe Plateau in the Altai Mountains in the book "Atlas of the Caves of Russia" based on the records of I.S. Turbanov (Turbanov et al. 2019). In recent years, the author had an opportunity to visit six small caves in Southwestern Siberia. All caves are located in the Salair Ridge and in the Altai Mountains. Spiders were found in three out of six caves studied. The goal of this paper is to report all spider species found in these caves.

Material and methods

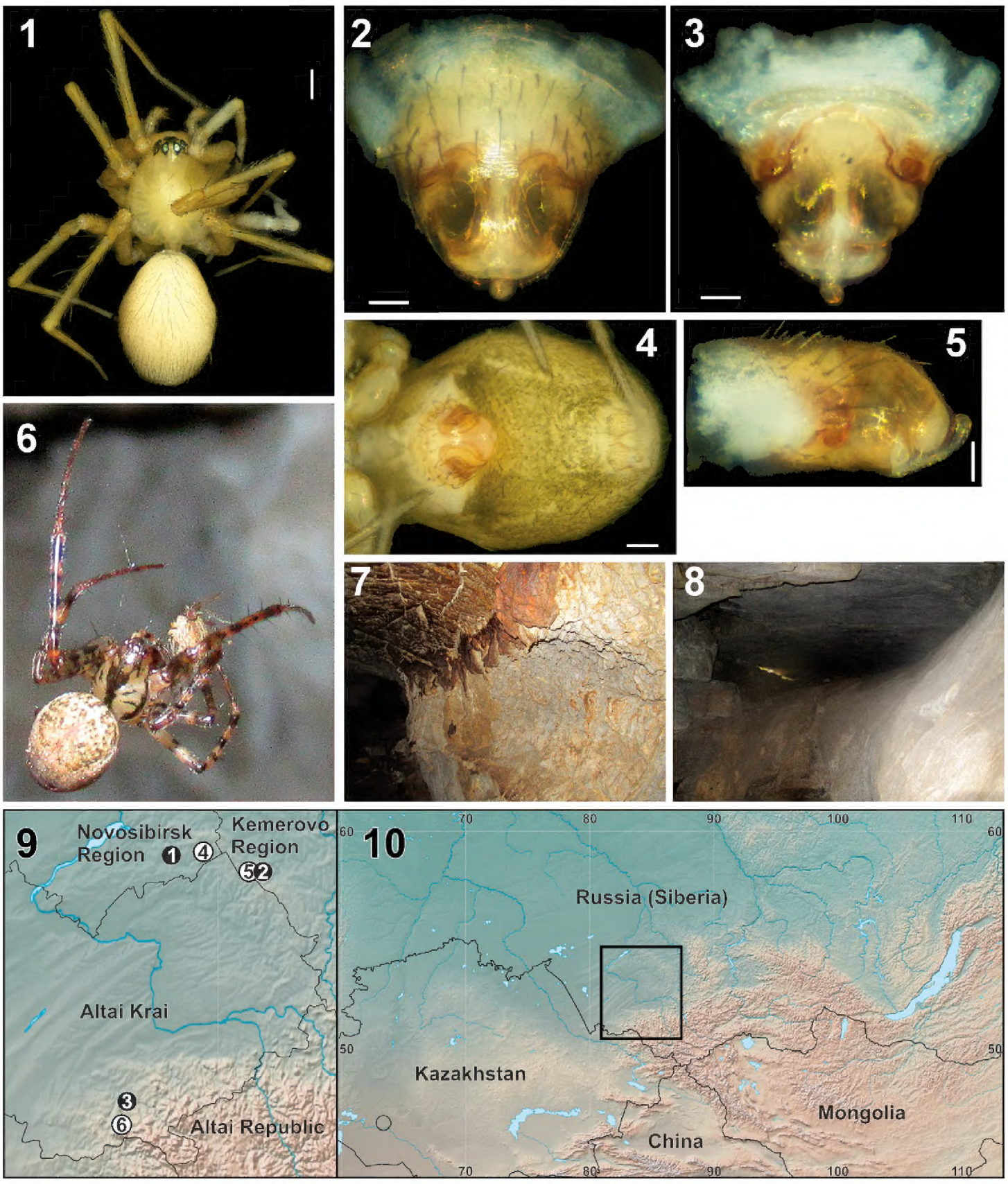
Specimen was photographed using an Olympus DP74 camera attached to an Olympus SZX16 stereomicroscope at the Altai State University. Photographs were taken in dish with black velvet paper on the bottom, filled with alcohol. Digital images were montaged using Helicon Focus software (https://www.photo-soft.ru/helicon-focus/). The data on the length and depth of caves are taken from the website "Caves. Information retrieval system" (https://speleoatlas.ru) and from the supplement to the book "The caves of Altai-Sayan mountainous region" (Tsykin et al. 1979). Material will be deposited in the Institute of Systematic and Ecology of Animals, SB RAS, Novosibirsk, Russia (ISEA).

The material was collected in three caves (Figs 9–10):

1. Russia, Novosibirsk Oblast, Barsukovskaya Cave, 54°22′N, 83°58′E, h=220 m, 29 August 2019, leg. A.A. Fomichev.
2a. Russia, Kemerovo Oblast, Gavrilovskaya II (Malaya Gavrilovskaya) Cave, 54°16′N, 85°52′E, h=260 m, 30 September 2019, leg. A.A. Fomichev.
2b. Same locality as above, 18 September 2020, leg. A.A. Fomichev, V.V. Sergeev, Yu.V. Dyachkov.
3. Russia, Altai Krai, Letuchikh Myshei Cave, 51°27′N, 83°07′E, h=350 m., 19 May 2020, leg. A.A. Fomichev, Yu.V. Dyachkov, E.Yu. Kulikov.

Three more caves were examined, but no spiders were found there (Figs 9–10):

4. Russia, Novosibirsk Oblast, Egor'evskaya (=Suenganskaya) Cave, 54°28′N, 84°35′E, h=270 m.



Figures 1–10. 1–5 *Improphantes improbulus*. **6** – Live *Metellina merianae* in Gavrilovskaya II Cave, feeding on Diptera. **7** – Letuchikh Myshei Cave. **8** – Gavrilovskaya II Cave. **9–10** –The map of caves where spiders were searched for. Filled circles – caves where spiders were collected; open circles – caves where no spiders were found. The numbers of caves correspond to that in the material and methods. Frame on Fig. 10 refers to Fig. 9. **1** – Habitus, dorsal. **2–3**, **5** – Epigyne, ventral, dorsal and lateral. **4** – Abdomen with intact epigyne. Scale bars: 0.2 mm (**1**); 0.05 mm (**2–3**, **5**); 0.1 mm (**4**).

5. Russia, Kemerovo Oblast, Gavrilovskaya I (Bol'shaya Gavrilovskaya) Cave, 54°15′N, 85°52′E, h=270 m.

6. Russia, Altai Krai, Yashchur Cave, 51°10′N, 83°02′E, h=540 m.

Results

Family Agelenidae

Pireneitega birulai (Ermolaev, 1927)

Material examined. 1♂ [2a].

Distribution. This species has Siberio-Central Asian boreo-montane range (Marusik et al. 2000). In Siberia, namely in the neighboring Tomsk Oblast, Altai Republic and Tuva Republic, it inhabits diverse habitats: clay cliffs, rocks, birch-aspen and *Abies-Pinus sibirica* forests and screes (Ermolajev 1927; Marusik et al. 2000; Azarkina and Trilikauskas 2012).

Notes. In the WSC (2020) *P. birulai* is listed as a junior synonym of *P. luctuosa* (L. Koch, 1878). *Pireneitega luctuosa* lives in caves in the southern China (Zhang et al. 2017; Jiang et al. 2018). Yu.M. Marusik (pers. comm.) studied the type specimens of both taxa and came to a conclusion that these are different species.

Family Linyphiidae

Improphantes improbulus (Simon, 1929)

Figs 1–5

Material examined. 1♀ [3].

Distribution. Troglophilic species (Mammola et al., 2018). This species is found from the mountainous regions of Europe and the Urals to East Kazakhstan (Esyunin and Efimik 1999). *Improphantes improbulus* inhabits caves and highlands in Europe (Thaler 1986). In the Urals, it is known to occur in the elphin birch woodland, mountain lichen tundra, limestone denudations and rocks (Esyunin and Efimik 1999). *Improphantes improbulus* was reported from the Kurmanaevskaya Cave and the Tash-Astinskii Grotto in Urals (Esyunin and Efimik 1999). This species is recorded from the Altai Mountains and from Siberia for the first time.

Stemonyphantes taiganoides Tanasevitch, Esyunin et Stepina, 2012

Material examined. 3♀ [3].

Distribution. This species is distributed from the Tyumen Oblast of Russia, through the Pavlodar Region of Kazakhstan to the Altai Mountains (Tanasevitch

et al. 2012). It was reported from the subalpine meadows of the Tigirek Mountain Range, which is located 40 km away from Letuchikh Myshei Cave (Fomichev 2016).

Family Philodromidae

Philodromus marusiki (Logunov, 1997)

Material examined. 1♀ [3].

Distribution. This species has a Mongolian range (Marusik et al. 2000). It was recorded in the Altai Krai, Altai, Tuva, Khakassia and Buryatia Republics of Russia (Logunov 1997; Marusik et al. 2000; Azarkina and Trilikauskas 2013; Fomichev 2015), south to the Arkhangai Aimag of Mongolia (Marusik and Logunov 1999). This species was reported from the vicinities of the Letuchikh Myshei Cave by Azarkina and Trilikauskas (2013). The species inhabits rocky cliffs and probably is active mostly at night (Marusik et al. 2000). The single female was collected in the entrance part of the cave.

Family Tetragnathidae

Metellina merianae (Scopoli, 1763)

Fig. 6

Material examined. 1♂ [1], 1♂ 2♀ 1juv. [2a], 2♂ 2♀ [2b].

Distribution. This is a troglophilic species (Mammola et al. 2018). *Metellina merianae* is widespread in Europe (Nentwig et al. 2020) and is reported east to Urals (Mikhailov 2013) and the Altai Mountains (Levina and Mikhailov 2004). It was reported from the caves of Iran, the Caucasus, the Crimea, the Russian Plain and the Urals (Marusik et al. 2014; Turbanov et al. 2016). Outside the caves, this species occurs in the shaded habitats with boulders, along the creeks and in the cellars (Marusik et al. 2014). In the northern part of the Altai Mountains it was collected along a swampy stream in a birch forest (Levina and Mikhailov 2004). The species reported from the Novosibirsk Oblast (Barsukovskaya Cave) for the first time. Records in the Barsukovskaya and Gavrilovskaya II Caves represent the northeastern-most localities of its distribution range.

Family Theridiidae

Thymoites bellissimus (L. Koch, 1879)

Material examined. 1♀ [2b].

Distribution. This species has a Trans-Palaearctic boreal range and is widespread in Siberia (Marusik et al. 2000; Mikhailov 2013). In the neighboring Tuva Republic, it inhabits stony debris and mesophytic meadows (Marusik et al. 2000).

Discussion

Of six explored caves, spiders were found only in three, which are the most short and shallow: the Gavrilovskaya II Cave (length 32 m/depth 0 m (horizontal cave)/3 spider species), the Letuchikh Myshei Cave (87 m/0 m/3 species) and the Barsukovskaya Cave (195 m/19 m/1 species). These caves are relatively dry and due to their small length and depth they are warm in summer time. Caves, where spiders were not found, are longer and deeper: the Egor'evskaya Cave (208 m/33 m), the Gavrilovskaya I Cave (280 m/15 m) and the Yashchur Cave (404 m/69 m). These three caves are colder and much wetter. It can be assumed that in most caves in the Southwestern Siberia, temperatures are too low for spiders and the troglophilous spider fauna is scarce and distributed very locally.

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